

REMARKS

Applicant thanks the Examiner for the thorough consideration given the present application. Claims 1-10 are pending in the present application. Claims 1, 5, and 7-10 are the independent claims.

Amendments to the Claims:

Claims 1, 5, and 7-10 have been amended in order to clarify the elements of the present invention and emphasize the differences from the cited documents. No new matter is added by these amendments.

More specifically, the following amended elements are supported by the Specification at least in the following particulars:

-- "mixes a received high frequency signal with a local oscillation signal so as to convert the high frequency signal into an intermediate frequency signal." See, Disclosure, page 2, lines 13-17.

-- "generating a reference signal." See, Disclosure page 11, lines 2-5.

-- "shifting a predetermined frequency of the reference signal so as to shift a frequency of the local oscillation signal." See, Disclosure, page 9, lines 6-14.

-- "only in a channel in which interference occurs." See, disclosure, page 9, lines 6-14, and page 12, lines 8-13.

Rejections under 35 U.S.C. 102(b)

Claims 1-3 and 5-10 are rejected under 35 U.S.C. 102(b) as being unpatentable as anticipated by Mishima, et al. (U.S. Patent 5,600,680) [hereinafter "Mishima"].

The present invention not only reduces interference in the particular channel but also improves the image quality in a channel having a relatively high frequency. Thus, the present invention is such that the frequency of the reference signal in the PLL circuit is shifted only for a channel in which interference occurs. This brings about a shift in the LO signal frequency, causing the interfering component to shift to a frequency which is almost unrecognizable. As a result, interference in the particular channel is reduced. See, Disclosure, page 9, lines 6-14.

The present invention reduces interference without causing any adverse effect on other channels having a relatively high frequency in a PLL circuit used for a super-heterodyne receiver. See, Disclosure, page 7, lines 18-23. In the super-heterodyne receiver, a received RF (radio frequency) signal is mixed with an LO (local oscillation) signal generated by a local oscillating circuit such that the frequency of the RF signal is converted to an IF (intermediate frequency) signal. See, Disclosure, page 2, lines 2-17. For example, when the RF frequency of the received video signal is 91.25 MHz, the LO signal frequency is represented by the following equation: $91.25 + 45.75 = 137$ MHz. Therefore, when the RF signal is mixed with the LO signal, the video IF signal of 45.75 MHz is picked up. See, Disclosure, page 5, lines 13-20. In this case, a 46 MHz interference component, which is produced by mixing a double harmonic wave of the RF signal and the LO signal, is outputted ($91.25 \times 2 - 137 = 46$ MHz). The interfering component is mixed with the video IF component in a subsequent stage circuit, and an interference component of 250 kHz is outputted together with the video signal ($46 - 45.75 = 0.25$ MHz = 250 kHz). The interference component appears as striped pattern beats. The 250 kHz beat component is easily recognizable with human eyes. See, Disclosure, page 5, line 21 to page 6, line 6.

In the typical conventional PLL circuit, an LO signal frequency is uniformly shifted in order to prevent influence of the beat component. See, Disclosure, page 6, lines 7-18. In the conventional PLL circuit, the LO signal frequency greatly shifts from the reference frequency in

a channel having a high LO signal frequency. This causes the problem of picture deterioration. See, Disclosure, page 7, lines 1-13. That is, the conventional art shifts the LO signal frequency in favor of a picture quality in a particular, channel (channel having a video RF frequency of 91.25 MHz) over the adverse effect of image deterioration in a channel with a high LO signal frequency. See, Disclosure, page 7, lines 14-17.

Mishima discloses means for finely adjusting the oscillation frequency of the reference solid-state oscillation element; the oscillator (30, 29); the oscillation element (28); the capacitor (19, 17); and the variable capacitive element (17). However, they are completely different from the shifting means and the control means of the present invention in terms of the arrangement and the function. The invention of Mishima relates to a picture detector of a high frequency receiving apparatus. The conventional art disclosed by Mishima is to solve the following problem: use of a detection oscillator having low phase stability causes the white picture signal to have nonlinearity, so that it is impossible to carry out linear picture detection. See, Mishima, col. 2, lines 17-29.

Thus, according to Mishima, if the phase difference between the output signal of the detection oscillator and the intermediate frequency signal is not a predetermined phase difference ($\pi/4$)(rad), the frequency of the intermediate frequency signal is controlled so as to obtain the foregoing phase difference. See, Mishima, col. 3, lines 34-39. Specifically, a parallel capacitance of the reference solid-state oscillation element used for the PLL, circuit is finely adjusted by the variable capacitive element so as to obtain the foregoing phase different. See, Mishima, col. 3, lines 40-53.

As explained above, the object of the present invention is to reduce interference in a particular channel without causing any adverse effect on other channels having a relatively

high frequency. In contrast, the object of Mishima is to improve the detection linearity in the picture detection. Thus, Mishima and the present invention are completely different from each other in terms of not only the object but also of the arrangement and the effect. Therefore, Applicant respectfully submits that the present invention cannot be anticipated by Mishima.

Rejections under 35 U.S.C. 103(a)

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Mishima, et al. (U.S. Patent 5,600,680) [hereinafter "Mishima"].

Applicant respectfully submits that Claim 4 is allowable at least based on the allowability of independent Claim 1, upon which claim 4 depends.

Additionally, Applicant respectfully submits that although Mishima may teach a switch with an implied control function, as implied by the use in Mishima of a varicap diode or "varactor," it does not follow that the function implied teaches the same "control means" as specified in claim 1, which specified a "control means for causing the shifting means to shift the predetermined frequency of the reference signal only in a channel in which interference occurs." See, Claim 1, as currently amended. Whereas Mishima merely teaches that the varactor may act as a switch, the present application specifies that the switch open or close at when a particular channel is received.

Conclusion

Since the remaining patent cited in the Office Action has not been utilized to reject the claims, but merely to show the state of the art, no comment need be made with respect thereto.

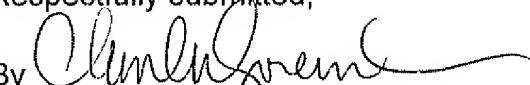
In view of the above amendments, Applicant believes the pending application is in condition for allowance. Thus, the Examiner is respectfully requested to reconsider the outstanding rejections and issue a Notice of Allowance in the present application.

However, should the Examiner believe there to be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Charles Gorenstein Reg. No. 29,271 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

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